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F2M ME M205 M209 M234 M244 M282
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U1S S1405 S1573 S1700 S1967 S3011 S3014

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(54) **Fire resistant materials**

(57) Fire-resistant materials such as used in ducting or for cladding is composed of sheets or panels each comprising a core 7 of resin-bonded mineral wool sheet, adhesively bonded to inner and outer metal cladding sheets 9. The panels are interconnected by longitudinal metal corner sections 11 each providing two channels 31, 39 at right angles to one another for receiving the sheet or panel edges.

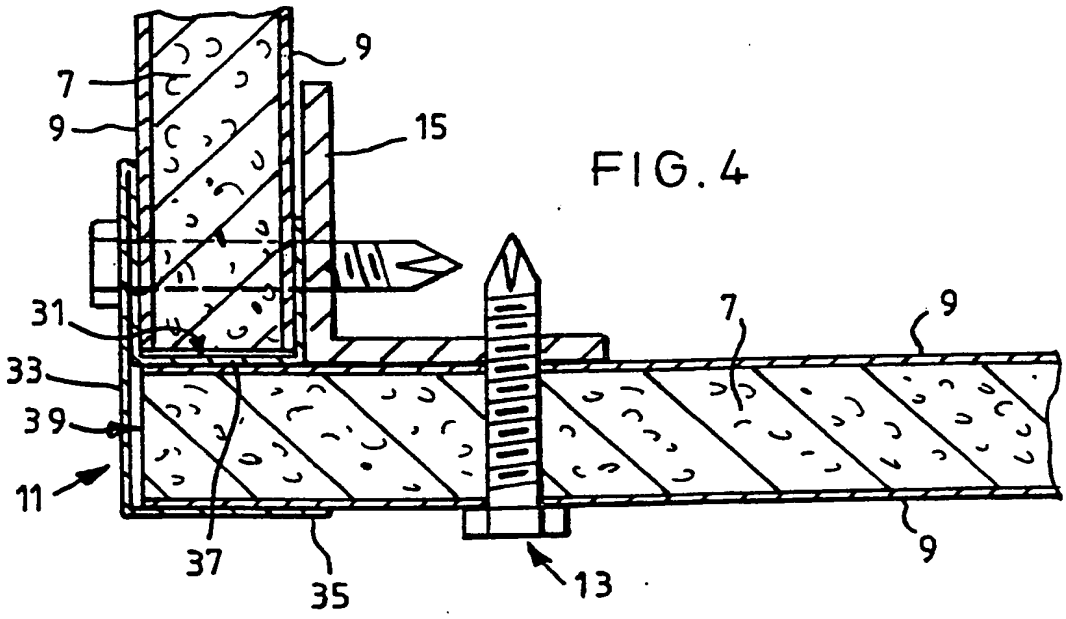

FIG. 4

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1990.

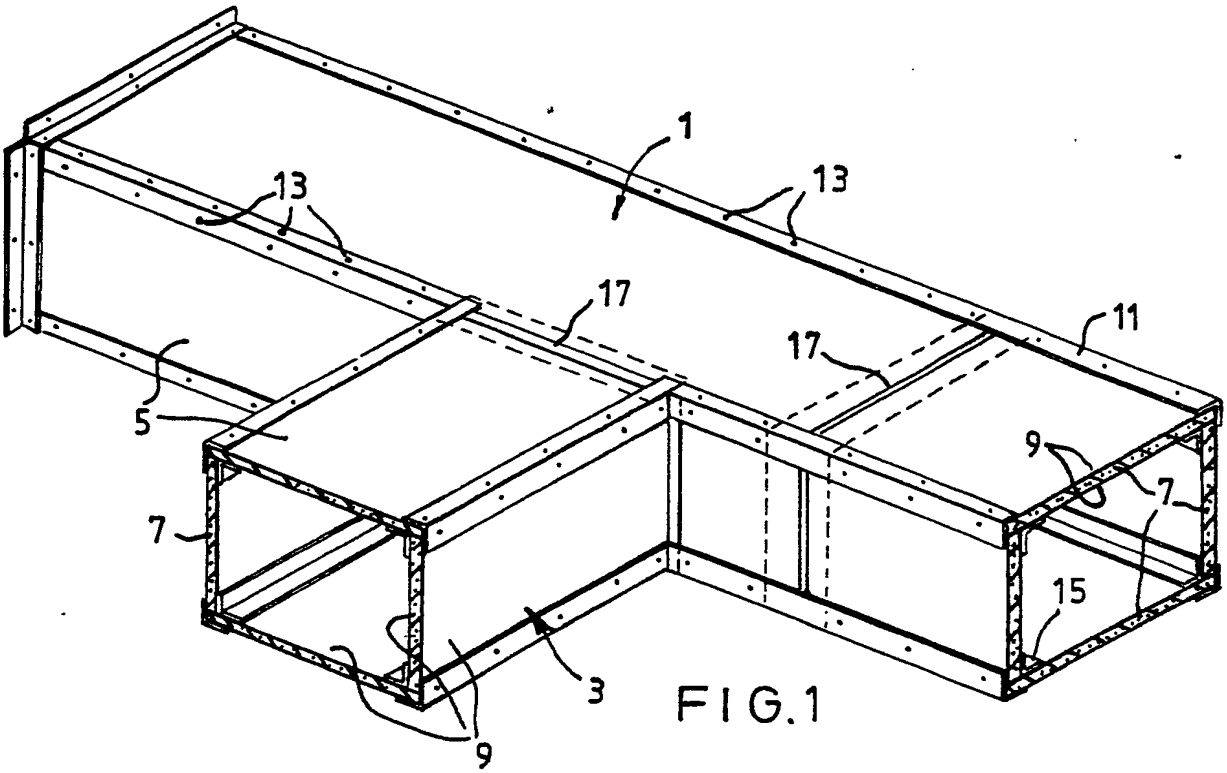

FIG.1

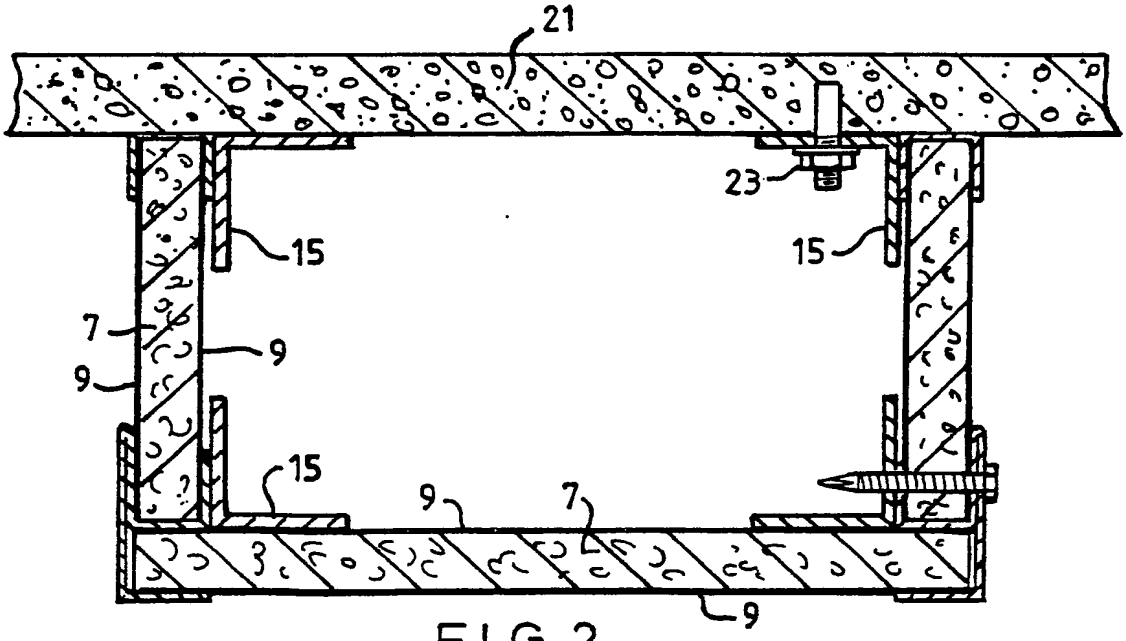

FIG.2

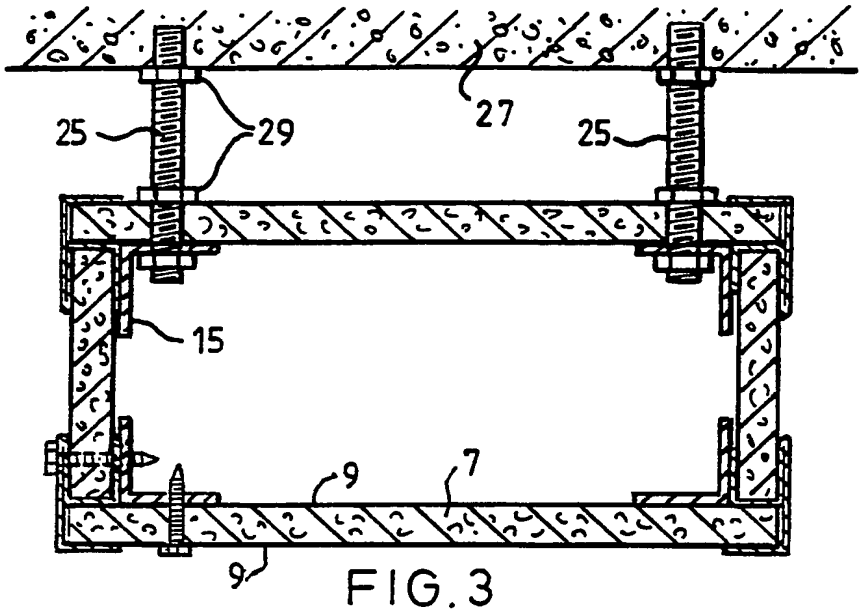

FIG. 3

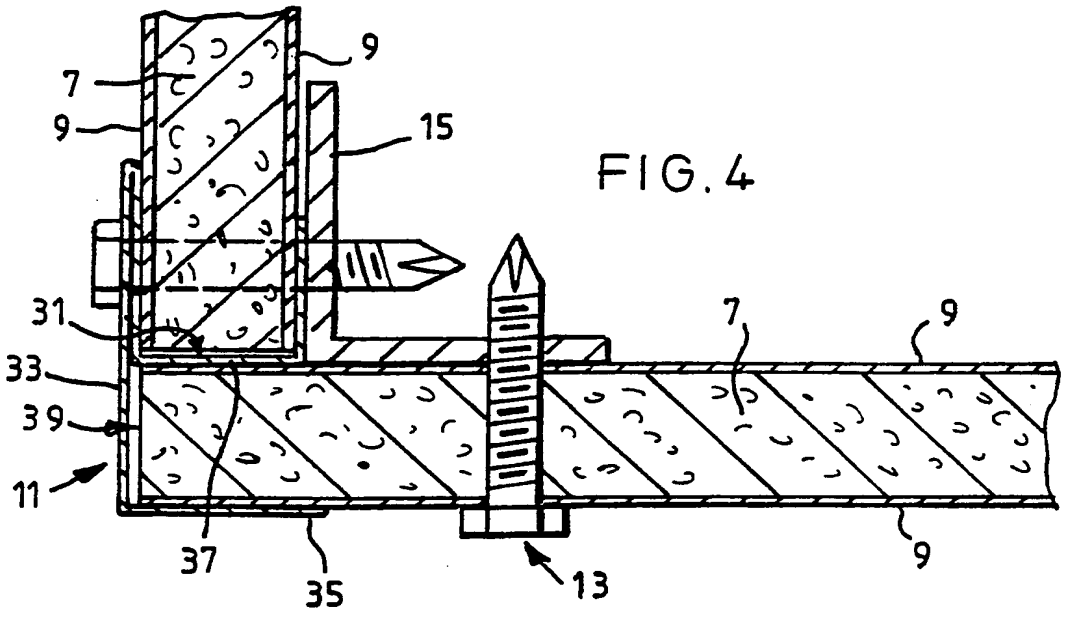

FIG. 4

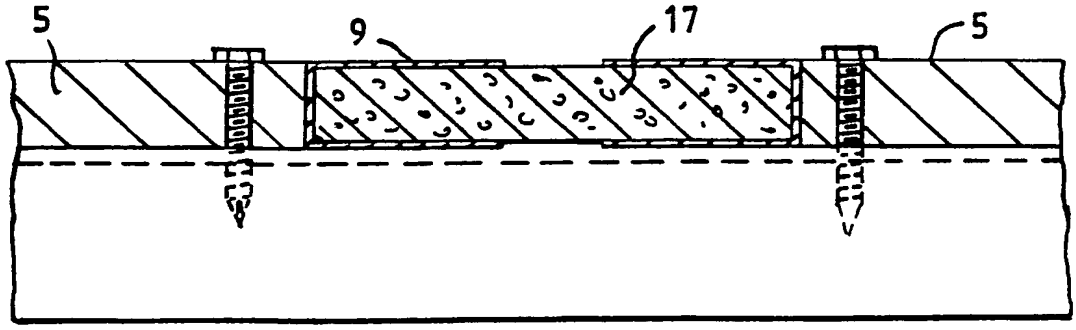

FIG. 5

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FIRE PROTECTION

This invention relates to materials for fire protection. The invention is particularly applicable to materials for making fireproof ducting but is also applicable to fire protection materials for other applications for example cladding.

Material used for fireproof ducting for air conditioning, services, smoke extracts, etc. must meet certain criteria and must in particular satisfy BS 476 part 24. The material must have and maintain integrity and stability; it should have a high thermal insulation value; it should be thin, strong and water-resistant. Furthermore, a ducting system should have such a design as to present low resistance to gases flowing through the duct and in particular should not induce excessive turbulence in the gas flow.

Existing sheet materials and assembly systems for fire-resisting ducting fail to meet one or more of the stated criteria and/or are extremely expensive.

The object of the present invention is to provide an improved material and assembly system for fire resisting ducting that will be of low cost and will be easy to use.

According to one aspect of the invention, a fire-resisting sheet material comprises a core of resin-bonded mineral wool, clad on at least one side with and adhesively bonded to a sheet metal, which will in general be sheet steel.

According to another aspect of the invention, an assembly system for fire-resistant ducting comprises a metal section which integrally comprises two channels with their open sides at right angles to one another and with the base of one channel adjacent a side of the other channel.

Such a section serves to receive the edges of adjacent sheets or panels at right angles at a corner of a duct. It can be made by extrusion or by folding and/or fabricating sheet metal. In general the metal will be sheet steel.

The mineral material used in the present panels may for example be the material known as "Spiralite" (trade mark) which is produced from diabase rock bonded with a phenolic resin and incorporating a small amount of sunflower oil as a dust suppressant and to enhance water repellency. Commercially available "Spiralite" board has excellent fire resistence, is chemically inert,

vermin and rot proof, and water-repellent. Its density is nominally 200kg per cubic meter, compressive strength is high and thermal conductivity is 0.037 W/mK.

A possible alternative mineral material is the high-density rock wool known as "Conlit" (trade mark).

The mineral wool material is bonded by a water-insoluble adhesive, between two sheets of thin galvanized mild steel. This provides panels of fire-resisting material which are light, strong, water-resistent, of high integrity and heat insulation, can be cut on site with hand tools if necessary, and are of modest cost. The panel thickness may for example be of the order of 22mm, but can readily be increased to provide greater fire resistance.

The integral metal cladding can largely eliminate the need for separate framing, and consequently the material can be used to assemble fire-resistant ducting with a substantially smooth internal surface producing very little turbulence and resistance to gas flow.

The twin-channel corner section proposed herein can be

used to form the corners of ducting, providing easy assembly, a neat appearance, and protection for the exposed mineral core at the panel edges. The corner section allows relative thermal expansion and other movement, and also accommodates manufacturing and installation imperfections.

The panel material can directly accept screw or drilled bolt fixings.

Ducting can be installed using an unprotected steel framework, consisting for example of light steel angle section supported from hanger rods or fixed by screws, expansion bolts, or any other conventional fixing means. Gaps or penetrations can be sealed by a suitable mastic.

Commercially available mineral wool sheets are commonly made with a scrim on the sheet faces. If such commercially available sheets are used in performing the invention, it may be desirable to cut the sheet material into strips of a width equal to the desired panel thickness, and to place the cut strips side by side, with or without a bonding agent between them, so that

the scrim-faced surfaces abut, and scrim-free clean surfaces (corresponding to the thickness of the original material) are left exposed at the surfaces of the composite sheet thus formed, the sheet metal cladding being then glued to these exposed scrim-free surfaces. This can provide a very strong construction, analogous to the well known "block board" form of timber.

Alternatively, the mineral wool sheets may be made without any surface scrim, the sheet metal cladding being glued directly to the surfaces of the mineral wool sheets.

It may be desirable to use mineral wool material of greater than the standard commercial density, for example around 207kg per cubic meter.

The present invention is applicable particularly but not exclusively to production of fireproof ducting for smoke extracts and fresh air inlets, and fire stopping risers and ducts.

The invention is illustrated by the accompanying drawings, in which:

Figure 1 is a perspective view of part of a ducting system

Figure 2 shows a three-sided duct

Figure 3 shows a suspended duct

Figure 4 shows a duct corner detail

Figure 5 shows a longitudinal join between panels.

Figure 1 shows a main duct 1 and a branch duct 3, each made of panels 5 of resin-bonded mineral wool sheet 7 adhesively bonded to inner and outer galvanized mild steel sheets 9. The ducts are of rectangular cross section, the clad mineral wool sheets being held together by corner sections 11 in which the sheet edges are slotted and held by screws 13. Within the internal angles of the ducting are longitudinal mild steel angle sections 15 providing structural strength, secured by the same screws 13. This provides a strong light duct with a smooth internal surface minimising turbulence in the gas flow through the duct.

Joints between the edges of panels in the running length direction are closed by special jointing strips 17 which, as can be seen in Figure 5, provide an essentially flush internal surface of the duct, again minimising turbulence.

Figure 1 shows a four-sided ducting, that is to say ducting in which all four sides are composed of the clad mineral wool panels.

Figure 2 shows similar components used to assemble a three-sided duct, of which the fourth side is closed by masonry 21 to which the duct angle sections 15 are attached by suitable masonry bolts 23.

Figure 3 shows a four-sided duct mounted by screw-threaded hanger rods 25 screwed into the masonry 27 adjoining a services void and secured to the ducting by lock nuts 29, the hangers extending through the duct angle sections 15.

Figure 4 shows a detail of the duct corner section 11 which provides a neat covering for and locates the abutting edges of the panels.

The corner section 11 is made of galvanized mild steel sheet, bent to form a first channel 31. The sheet material forming the outer side of this channel is bent back on itself through 180° to form a reverse limb 33 which in turn has a portion 35 bent through 90° to lie parallel with the base 37 of the channel 31, so that the limb 35, base 37 and reverse limb 33 together form a second channel 39 facing inwards at right angles to the channel 31.

The edges of respective panels are inserted in the channels 31, 39 and are located by these at right angles to one another, with the channels forming a neat and attractive protective covering and locating means for the edge regions of the panels. The corner section 11 will accommodate relative movements of the panels, and also imperfections arising from manufacture or installation procedures.

The jointing strip 17 may for example comprise a mineral wool core with a cladding of galvanized mild steel sheet, similar to the duct panels 5 but thinner by an amount corresponding to the cladding thickness, for example 2mm thinner. Adjacent ends of the duct panels 5

have projecting portions of the steel cladding 9 between which the mineral wool core is absent or has been removed, for example by routing. Slots or channels are thus formed in the edges of the duct panels 5, into which the joint strip 17 fits closely, as shown in Figure 5. The edges of the panels 5 may abut, or a small gap of for example 20mm may be left between them, being bridged by the joint strip 17. The latter may for example have a width of 100mm, and it can be made in strips, to be cut to length on site.

Alternatively, the joint strip may comprise a mineral wool core with galvanized stainless steel sheet cladding projecting from opposite sides to form respective channels into which edges of the duct panels 5 are slotted.

In either embodiment, the resulting joint between duct panels 5 has a substantially flush surface, and will cause little or no turbulence in gases flowing through the duct.

Claims

1. A fire-resisting sheet material, comprising a core of resin-bonded mineral wool clad on at least one side with an adhesively bonded to a sheet metal.

2. Sheet material as claimed in Claim 1, in which the sheet metal is sheet steel.

3. Sheet material as claimed in Claim 1 or 2, bonded by a water-insoluble adhesive.

4. Sheet material as claimed in Claim 1, 2 or 3 having sheet metal cladding adhesively bonded on both sides of the core.

5. Sheet material as claimed in any preceding claim in which the core is a mineral wool derived from diabase rock bonded with a phenolic resin.

6. For assembling sheet or panel material, a metal section of indefinite length and substantially uniform cross-section which integrally comprises two channels disposed with their respective open sides at right angles to on another and with the base of one said channel adjacent a side of the other channel, for receiving the edges of adjacent sheets or panels in the said channels with the sheets or panels at right angles

to one another.

7. A duct comprising walls of sheet or panel material substantially at right angles to one another and interconnected at adjacent edges by one or more metal sections as claimed in the preceding claim.

8. Ducting as claimed in Claim 7, in which the sheet or panel material is a material as claimed in any of Claims 1 to 5.

9. Ducting as claimed in Claim 7 or 8 further including at least one jointing strip occupying a space between adjacent sheet or panel edges or ends, the sheet or panel material and/or the jointing strip having at least one projecting cladding portion overlapping the jointing strip or the sheet or panel material.

10. Sheet or panel material substantially as herein described with reference to the drawings.

11. Metal section for jointing substantially as herein described with reference to Figures 1 to 4 of the drawings.

12. A ducting system substantially as herein described with reference to the drawings.

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